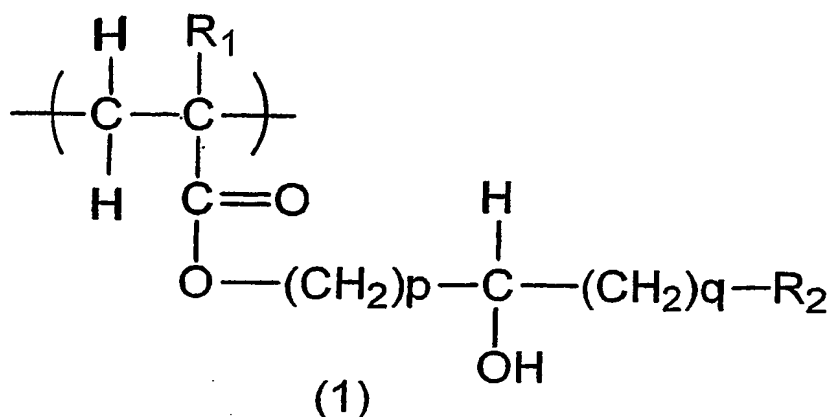


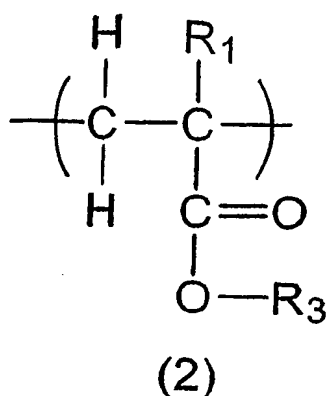
CLAIMS

1. A gap fill material forming composition characterized in that the composition is used in manufacture of semiconductor device by a method comprising coating a photoresist on a semiconductor substrate having a hole with aspect ratio shown in height/diameter of 1 or more, and transferring an image to the semiconductor substrate by use of lithography process, and that the composition comprises a polymer composed of only structural unit of formula (1)



wherein R_1 is hydrogen atom, methyl group, chlorine atom or bromine atom, R_2 is hydrogen atom or hydroxy group, p is the number of 1, 2, 3 or 4, q is the number of 0, 1, 2 or 3, and containing components having a molecular weight of 3000 or less in a rate of 20% or less; a crosslinking agent; and a solvent.

2. A gap fill material forming composition characterized in that the composition is used in manufacture of semiconductor device by a method comprising coating a photoresist on a semiconductor substrate having a hole with aspect ratio shown in height/diameter of 1 or more, and transferring an image to the semiconductor substrate by use of lithography process, and that the composition comprises a polymer composed of only structural unit of formula (1) and structural unit of formula (2)



wherein R_1 is as defined above, R_3 is C_{1-8} alkyl group, benzyl group, C_{1-6} alkyl group substituted by at least one fluorine atom, chlorine atom or bromine atom, or C_{1-6} alkyl group substituted by at least one C_{1-6} alkoxy group, and containing components having a molecular weight of 3000 or less in a rate of 20% or less, and containing the structural unit of formula (1) in a ratio of 0.10 to 0.95; a crosslinking agent; and a solvent, wherein the sum of the molar ratio of structural unit of formula (1) and the molar ratio of structural unit of formula (2) is 1.

3. The gap fill material forming composition according to claim 1 or 2, wherein the polymer has a weight average molecular weight of 5000 to 20000.

4. The gap fill material forming composition according to claim 1 or 2, wherein the solvent has a boiling point of 145°C to 220°C.

5. The gap fill material forming composition according to claim 1 or 2, wherein the solvent is at least one solvent selected from the group consisting of butyl lactate, propylene glycol monobutyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate and cyclohexanone.

6. The gap fill material forming composition according to claim 1 or 2, wherein the crosslinking agent is a crosslinking agent having at least two crosslink-forming functional substituents.

7. The gap fill material forming composition according to any one of claims 1 to 6, further containing an acid or an acid generator.

8. A method for forming a gap fill material for use in lithography process of manufacture of semiconductor device, comprising coating the gap fill material forming composition according to any one of claims 1 to 7 on a semiconductor substrate having a hole with aspect ratio shown in height/diameter of 1 or more and baking it.
9. A method for forming photoresist pattern for use in manufacture of semiconductor device, comprising coating the gap fill material forming composition according to any one of claims 1 to 7 on a semiconductor substrate having a hole with aspect ratio shown in height/diameter of 1 or more, baking it to form a gap fill material, forming a photoresist layer on the gap fill material, exposing the semiconductor substrate covered with the gap fill material and the photoresist layer to light, and developing the photoresist layer after the exposure to light.
10. The method for forming photoresist pattern according to claim 9, further comprising a step of forming an anti-reflective coating before or after the step of forming the gap fill material on the semiconductor substrate.